

## Second Level Dictionary

This section presents the definitions for the major elements of work established at the second level of the WBS. Each element is presented below with the definitions first, followed by a list of subordinate elements, and finally notes if there are any. The first sentence of each definition discusses the relevance that each phase has on the definition. If the definition for a given element is different depending on the life cycle phase, it will be explained. If not, then the first sentence simply states that the definition is consistent across phases.

The HTRW WBS considers all possible items and activities by including the “Other” items at second level and lower levels. The “Other” items are designated by the number “9X.” The user is to replace the “X” with a number, 0 through 9, and assign an appropriate item description and unit of measure. These “9x” elements are reserved for activities which are unique or for special tasks that cannot be described closely by available elements. Again, for the structure to stay consistent and useful as much as possible, users are discouraged to use the “Others” elements.

### .01 PROGRAM MANAGEMENT, SUPPORT, & INFRASTRUCTURE

The definition for this element is consistent across all phases (through 6). The Program Management, Support & Infrastructure element is optional. It includes the development of plans and programs associated with Environmental Compliance, Conservation, and Environmental Management. The professional support functions associated with these plans and programs and in support of other environmental management activities are also included in this element. Program infrastructure includes many of the cost elements such as insurance or the cost of money that are required to conduct the program but are not part of a specific project element. The Construction Management and Government - Construction Management elements provide for effort by the prime contractor or government agency responsible for the work. These business-related activities are generally (but not always) considered as overhead.

This element is optional because the structure can be used to estimate or report costs without it. Some users may want only to estimate or report cost directly associated with the given project. If these elements are used to estimate or report cost, then the remaining elements included in this WBS will be considered as unburdened. If these elements are not used separately and the activities are distributed throughout the project, then the remaining elements are considered burdened.

### .02 PROJECT MANAGEMENT & SUPPORT

The definition for this element is consistent across all phases (1 through 6). The Project Management & Support element includes the development project engineering, engineering support, and other management activities specific to project. Unlike Program Management, this element is not considered optional nor is it generally considered overhead. While the definition for this element does not change from phase to phase, the magnitude of effort may. For example, the project support for Community Relations may be far greater during phase 2 Site Investigations/Studies and Research and Development.

While this element includes the project engineering required to develop plans and reports, the actual work to prepare, compose, edit, and produce the product (i.e., plans and reports) is included with the second level elements Preparation of Plans and Studies/Design & Documentation.

### 03 PREPARATION OF PLANS

The definition for this element is consistent across all phases (1 through 6). The Preparation of Plans element includes the development of all plans necessary to conduct environmental restoration, waste management, or facility decommissioning and dismantlement projects. Most of the plans listed below are self-explanatory. The element Work Plan is intended to include all work plans (e.g., Remedial Design or Remedial Action work plans) needed for all projects.

This task includes only the effort required to develop the plans. Work such as data acquisition (e.g., sample collection and analysis) is not part of this element.

### .04 STUDIES/DESIGN & DOCUMENTATION

Phase 1:

The studies for this element are far more limited. The only study of significance in phase 1 is the Hazardous Ranking System (HRS).

Phase 2:

The Studies/Design & Documentation element includes the development of all studies necessary to conduct environmental restoration, waste management, or facility decommissioning and dismantlement projects.

Phase 3:

All of the design elements address the preliminary, intermediate, pre-final, and final design. The design includes project design for environmental restoration projects and for decommissioning projects. The Facility Design element is the construction design for treatment, storage, and disposal facilities.

This element addresses only design work and should not be confused with the entire design phase. Phase 3's Remedial Design/Pre-construction includes all elements of work during this life cycle phase (e.g., Program Management, Project Management, Preparation of Plans).

### 05 SITE WORK

The definition for this element is consistent across all phases (1 through 6). The Site Work element includes the primary elements of work to establish the physical infrastructure necessary to accomplish the project. The elements listed below fall into three categories Site Preparation, Site Improvement, and Site Utilities. They are not listed as subordinate elements to these three categories in the structure because the listed elements should be at the third (not fourth) level. Each of these elements is based on the site work cost models developed by the Tri-Services Committee (Air Force, COE, and Navy).

This element addresses the clean work associated with the project. Clean work in this case means that there is no contact with contaminated media. If during the course of this site work some contaminated soil must be excavated, then the WBS element Contaminate Soil Collection under the second level element Solids/Soils Containment Collection, or Control should be used.

### .06 SURVEILLANCE & MAINTENANCE

This element includes activities to maintain the integrity to ensure acceptable risks to the environment and human health and safety posed by the radiological chemical munitions, or other hazardous materials inventory of the active/inactive waste sites and facilities.

The Facility Transition element listed below addresses the activities involved to inventory and coordinate the facility transition from production operations to S&M status.

The definition for the Outdoor/Indoor S&M elements is consistent across the first four phases (1 through 4). These elements are required during the first four phases of the project's life cycle for those projects that pose an immediate or potentially catastrophic threat, to human health of the environment, prior to or during remedial action or D&D. It is recommended that Pre-remedial S&M cost be captured using Phase 1.

After remedial action or D&D, this element will be used for the long-term surveillance & maintenance or monitoring necessary to ensure the stability of the remediation (Phase 6). An example would be the S&M of barrier caps over waste sites. Long-term groundwater monitoring activities are covered under Level 2 elements .07-.09. During the waste site/facility Operations Phase, surveillance and maintenance activities will be considered to be a part of the operations activities.

## **.07 INVESTIGATIONS & MONITORING/SAMPLE COLLECTION**

Phases 1 - 3:

This element in these phases includes the initial site Reconnaissance and other generally available site characteristics such as Meteorological Monitoring. It also includes the other site investigations including Contaminant surveys, groundwater/surface water geological and soil investigations, and other geophysical investigation. The sample collections of all media are also included.

Phase 4:

This element in this phase includes the other site investigations including Contaminant surveys, groundwater/surface water geological and soil investigations, and other geophysical investigation. The sample collections of all media are also included.

Phases 5 and 6:

This element in these phases includes only the sample collection of all media.

This element includes all of the fieldwork necessary to conduct on-site investigations and sample collection. The first seven subordinate elements address the investigation of the site's physical (e.g., geological) characteristics. The remaining subordinate elements include sample collection.

## **08 SAMPLE ANALYSIS**

The definition for this element is consistent across the all phases (1 through 6). The first 10 subordinate elements listed below address the laboratory analyses of the samples. The analyses for these items are in accordance with the Certified Laboratory Procedures (CLP) when they are conducted in fully equipped on-site laboratory facility or off-site laboratory facility. The mobile (often a trailer) analyses are less extensive. The Real Time analyses are conducted on location often with instruments that provide an immediate reading.

The user of this structure must exercise caution to identify whether costs included for the on-site CLP analyses are burdened or unburdened. If they are unburdened then it should be noted whether the overhead type costs are included in the element .04 Program Management, Support, & Infrastructure.

## **09 SAMPLE MANAGEMENT/DATA VALIDATION/DATA EVALUATION**

The definition for this element is consistent across the all phases (1 through 6). This element provides for the chain-of-custody for the sample, the quality assurance, usability and data analysis. The entire procedure for sample collection through final analysis is addressed. Sample disposal cost is included with derived waste disposal. Modeling is also included in this element.

## 10 TREATABILITY/RESEARCH & DEVELOPMENT

The definition for this element is consistent across phases (3 and 4). This element includes the technology development testing and evaluation necessary to ensure successful implementation. All types of technologies (e.g., In Situ Biological, Ex Situ Thermal, Decontamination) are included in this element whether environmental restoration, waste management, or decommissioning & dismantlement.

## 11 TREATMENT PLANT/FACILITY

Phase 4:

The Phase 4 definition for waste management facilities is ~~is~~ Waste Management Facility Construction. The constructions of these subordinate elements follow typical construction procedures. The Construction Standard Institute (CSI) codes are used for each facility type at the fourth level of the WBS.

Phase 5:

The Phase 5 definition is ~~is~~ Waste Management Facility Operations & Maintenance. The operation for these facilities includes the operations labor, material, and consumable. The maintenance for these facilities includes the maintenance labor, replacements, material, and consumable.

The actual facility design (phase 3) is conducted under WBS element .04.12 Facility Design and the treatability and research and development is included in WBS .10.

## 12 STORAGE FACILITY

Phase 4:

The Phase 4 definition for waste management facilities is ~~is~~ Waste Management Facility Construction. The constructions of these subordinate elements follow typical construction procedures. The Construction Standard Institute (CSI) codes are used for each facility type at the fourth level of the WBS.

Phase 5:

The Phase 5 definition is ~~is~~ Waste Management Facility Operations & Maintenance. The operation for these facilities includes the operations labor, material, and consumable. The maintenance for these facilities includes the maintenance labor, replacements, material, and consumable.

Phase 6:

Phase 6 for this element is ~~is~~ On-Site Storage Facility Surveillance & Long Term Monitoring. The surveillance for these facilities applies to storage facilities no longer in operation (accepting/processing waste) but not yet decommissioned.

## 13 DISPOSAL FACILITY

Phase 4:

The Phase 4 definition for waste management facilities is ~~is~~ Waste Management Facility Construction. The constructions of these subordinate elements follow typical construction procedures. The Construction Standard Institute (CSI) codes are used for each facility type at the fourth level of the WBS.

Phase 5:

The Phase 5 definition is ~~is~~ Waste Management Facility Operations & Maintenance. The operation for these facilities includes the operations labor, material, and consumable. The

maintenance for these facilities includes the maintenance labor, replacements, material, and consumable.

Phase 6:

Phase 6 for this element is On-Site Disposal Facility Surveillance & Long Term Monitoring. The surveillance for these facilities applies to disposal facilities no longer in operation (accepting/processing waste) but not yet decommissioned.

## 14 ORDNANCE & EXPLOSIVES REMOVAL & DESTRUCTION

Phase 4 and 5:

This element includes the locating, removing, and destruction of all ordnance, conventional or chemical, fused or unfused, related scrap, propellants, and delivery vehicles during remedial action. It provides for subsurface data to delineate the extent of the contamination. It also includes the construction of temporary explosive storage bunkers.

Other than the removal of Chemical Warfare Materials (CWM), the work associated with CWM is not included in this element. Rather, CWM is addressed in a similar manner to the remote handled radioactive waste. The treatment to remediate a CWM stockpile will likely require the construction and operation of a specialized facility such as WBS element 11.12 Waste Management Remote Functional Area.

## 15 DRUMS/TANKS/STRUCTURES/MISC DEMOLITION & REMOVAL

The definition for this element is consistent across the all phases (1 through 6). This includes the demolition and removal during remedial action of HTRW contaminated drums, tanks, contaminated paint removal, and other structures by excavation and downsizing. This element can be used for interim removal actions, and facility shutdown/material removals.

This element does not include filling portable hazardous waste containers or transport of wastes to treatment or disposal facilities. See WBS .19 Solids Collection and Containment, and WBS .32 Material Handling/Transportation.

## 16 AIR POLLUTION/GAS COLLECTION & CONTROL

Phase 4:

This element includes the construction of trench systems, well systems and other systems needed to capture fugitive dust, vapor and gas.

Phase 5:

This element includes the operation of trench systems, well systems and other systems needed to capture fugitive dust, vapor and gas.

## 17 SURFACE WATER/SEDIMENTS CONTAINMENT, COLLECTION, OR CONTROL

Phase 4:

This element provides for the containment, collection or control of contaminated surface water through the construction of storm drainage piping and structures, erosion control measures, and civil engineering structures such as berms, dikes and levees. Includes the collection of surface water through the construction of lagoons, basins, tanks, dikes, and pump systems.

Phase 5:

This element provides for the operation and maintenance of storm drainage piping and

structures, erosion control measures, and civil engineering structures such as berms, dikes and levees. Includes the collection of surface water through the construction of lagoons, basins, tanks, dikes, and pump systems.

The effluent piping to treatment facility is included this element.

## 18 GROUNDWATER CONTAINMENT, COLLECTION, OR CONTROL

Phase 4:

This element provides for the containment, collection or control of contaminated groundwater through the construction of piping, wells, trenches, slurry walls, sheet piling and other physical barriers. It includes the collection of groundwater through the construction of lagoons, basins, tanks, dikes, and pump systems

Phase 5:

This element provides for the operation and maintenance of piping, wells, trenches, slurry wall sheet piling and other physical barriers. It includes the collection of groundwater through the construction of lagoons, basins, tanks, dikes, and pump systems

The effluent piping to treatment facility is included this element.

## 19 SOLIDS/SOILS CONTAINMENT, COLLECTION, OR CONTROL

Phase 4:

This element includes containment, collection or control of HTRW contaminated solids and soils through the excavation of contaminated soil and capping of contaminated area. The construction of a RCRA landfill can be accomplished through the use of the bottom barrier in conjunction with a cap.

Phase 5:

This element provides for the operation and maintenance of cap and gas vent systems. The operations of an active landfill are included under the Disposal Facility element.

The effluent piping to treatment facility is included this element.

## 20 LIQUID WASTE/SLUDGE (e.g., UST/AST) CONTAINMENT, COLLECTION, OR CONTROL

Phase 4:

This element includes containment, collection, or control of HTRW-contaminated liquids and sludge through dredging and vacuuming, and the furnishing and filling of portable containers. Includes the containment of liquids and sludge through the construction of lagoons, basins, tanks, dikes, and drain system.

Phase 5:

This element is for operations and maintenance of vacuuming, lagoons, basins, tanks, dikes, and drain system.

The effluent piping to treatment facility is included this element.

## 21 IN SITU BIOLOGICAL TREATMENT

Phase 4:

This element includes procurement of portable treatment equipment (that can be used on more than one project or sub-project), transportation of treatment system components, and installation of biological treatment systems. Biological treatment is the microbial transformation of organic compounds. Biological treatment processes can alter inorganic compounds such as ammonia and nitrate, and can change the oxidation state of certain metal compounds. Includes in-situ biological treatment such as land farming and phytoremediation.

Phase 5:

This element includes the operations and maintenance of in situ bioremediation systems.

This element addresses the In Situ application of these technologies, therefore, it is not part of a treatment train and does not require hazardous material removal, handling or transportation.

## 22 EX SITU BIOLOGICAL TREATMENT

Phase 4:

This element includes procurement of portable treatment equipment (that can be used on more than one project or sub-project), transportation of treatment system components, and installation of biological treatment systems. Biological treatment is the microbial transformation of organic compounds. Biological treatment processes can alter inorganic compounds such as ammonia and nitrate, and can change the oxidation state of certain metal compounds. Includes ex situ biological treatment such as activated sludge, composting, trickling filters, anaerobic, and aerobic digestion.

Phase 5:

This element includes the operations and maintenance of these ex situ bioremediation systems.

If this element is part of a treatment train or facility, then the overall operation of the facility will be included in WBS .11 Treatment Plant/Facility.

## .23 IN SITU CHEMICAL TREATMENT

Phase 4:

This element includes procurement of portable treatment equipment (that can be used on more than one project or sub-project), transportation of treatment system components and installation of chemical treatment systems. Chemical treatment is the process in which hazardous wastes are chemically changed to remove toxic contaminants from the environment. The types of in situ treatment include chemical barriers, oxygen release compounds, and neutralization.

Phase 5:

This element includes the operations and maintenance of these in situ chemical treatment systems.

This element addresses the In Situ application of these technologies, therefore, it is not part of a treatment train and does not require hazardous material removal, handling or transportation.

## .24 EX SITU CHEMICAL TREATMENT

Phase 4:

This element includes procurement of portable treatment equipment (that can be used on more than one project or sub-project), transportation of treatment system components, and installation of chemical treatment systems. Chemical treatment is the process in which hazardous wastes are chemically changed to remove toxic contaminants from the environment. The types of ex situ treatment include oxidation/reduction, solvent extraction, chlorination, ozonation, ion exchange, neutralization, hydrolysis, photolysis, dechlorination, and electrolysis reactions.

Phase 5:

This element includes the operations and maintenance of these ex situ chemical treatment systems.

If this element is part of a treatment train or facility, then the overall operation of the facility will be included in WBS .11 Treatment Plant/Facility.

## 25 IN SITU PHYSICAL TREATMENT

Phase 4:

This element includes procurement of portable treatment equipment (that can be used on more than one project or sub-project) transportation of treatment system components, and installation of physical treatment systems. Physical treatment processes are the physical separation of contaminants from solid, liquid or gaseous waste streams. The treatments are applicable to a broad range of contaminant concentrations. Physical treatments generally do not result in total destruction or separation of the contaminants in the waste stream, consequently post-treatment is often required. The types of in situ physical treatment include circulating wells/in-well air stripping, air sparging and soil flushing.

Phase 5:

This element includes the operations and maintenance of these in situ physical treatment systems.

This element addresses the In Situ application of these technologies, therefore, it is not part of a treatment train and does not require hazardous material removal, handling or transportation.

## .26 EX SITU PHYSICAL TREATMENT

Phase 4:

This element includes procurement of portable treatment equipment (that can be used on more than one project or sub-project), transportation of treatment system components, and installation of physical treatment systems. Physical treatment processes are the physical separation of contaminants from solid, liquid or gaseous waste streams. The treatments are applicable to a broad range of contaminant concentrations. Physical treatments generally do not result in total destruction or separation of the contaminants in the waste stream, consequently post-treatment is often required. The types of ex situ physical treatment include filtration, sedimentation, flocculation, precipitation, equalization, evaporation, stripping, soil washing, carbon adsorption, and several other treatments. Includes process equipment and chemicals required for treatment.

Phase 5:

This element includes the operations and maintenance of these ex situ physical treatment systems.

If this element is part of a treatment train or facility, then the overall operation of the facility will be included in WBS .11 Treatment Plant/Facility.

## .27 IN SITU THERMAL TREATMENT.

Phase 4:

This element includes procurement of portable treatment equipment (that can be used on more than one project or sub-project), transportation of treatment system components and installation of thermal treatment systems. Thermal treatment is the destruction of wastes through exposure to high temperature in combustion chambers and energy recovery devices. The types of in situ treatments include thermal blanket, six-phase extraction, and in situ vitrification. It is included in this element to destroy organic. In situ vitrification is included under WBS .29 - In situ Stabilization / Fixation / Encapsulation to encapsulate radionuclides.



Phase 5:

This element includes the operations and maintenance of these in situ thermal treatment systems.

This element addresses the In Situ application of these technologies, therefore, it is not part of a treatment train and does not require hazardous material handling or transportation.

## **.28 EX SITU THERMAL TREATMENT**

Phase 4:

This element includes procurement of portable treatment equipment (that can be based on more than one project or sub-project), transportation of treatment system components, and installation of thermal treatment systems. Thermal treatment is the destruction of wastes through exposure to high temperature in combustion chambers and energy recovery devices. The types of ex situ thermal treatment include several processes capable of incinerating a wide range of liquid and solid wastes include fluidized bed, rotary kiln, multiple hearth, infrared, circulating bed, liquid injection, pyrolysis, plasma torch, wet air oxidation, supercritical water oxidation, molten salt destruction, and solar detoxification.

Phase 5:

This element includes the operations and maintenance of these ex situ thermal treatment systems.

If this element is part of a treatment train or facility, then the overall operation of the facility will be included in WBS .116 Treatment Plant/Facility.

## **.29 IN SITU STABILIZATION/FIXATION/ENCAPSULATION.**

Phase 4:

This element includes procurement of portable treatment equipment (that can be used on more than one project or sub-project), transportation of treatment system components, and installation of stabilization/fixation/encapsulation treatment systems. Stabilization/fixation/encapsulation processes attempt to improve the handling and physical characteristics of the wastes, decrease the surface area, limit the solubility of any pollutants and detoxify contained pollutants. The types of in situ treatments include inorganic/asphalt-base encapsulation, in situ vitrification, and pozzolan process. In situ vitrification is included in this element to encapsulate radionuclides. It is included under WBS .27 - In situ Thermal Treatment to destroy organic.

Phase 5:

This element includes the operations and maintenance of these in situ stabilization / fixation / encapsulation treatment systems.

This element addresses the In Situ application of these technologies, therefore, it is not part of a treatment train and does not require hazardous material removal, handling or transportation.

## **.30 EX SITU STABILIZATION/FIXATION/ENCAPSULATION.**

Phase 4:

This element includes procurement of portable treatment equipment (that can be used on more than one project or sub-project), transportation of treatment system components and installation of stabilization/fixation/encapsulation treatment systems. Stabilization/fixation/encapsulation processes attempt to improve the handling and physical characteristics of the wastes, decrease the surface area, limit the solubility of any pollutants and detoxify contained pollutants. The types of ex situ treatments include inorganic / asphalt-based encapsulation, sludge stabilization, and vitrification.

Phase 5:

This element includes the operations and maintenance of these ex situ stabilization / fixation / encapsulation treatment systems.

If this element is part of a treatment train or facility, then the overall operation of the facility will be included in WBS .11 Treatment Plant/Facility.

### **.31 FACILITY DECOMMISSIONING & DISMANTLEMENT.**

Phase 4:

This element includes specific equipment procurement, installation of dismantlement systems. Decommissioning and dismantlement includes all activities associated with shutdown, dismantlement, and final cleanup of a nuclear, CWM, or other facility.

Phase 5:

This element includes the operations and maintenance of these dismantlement systems.

The decontamination technology implementation activities are included in the In Situ technology WBS elements .23, .25, and .27. Some of the removal actions (e.g., asbestos abatement, piping & pipeline removal) are included in WBS element .15 Drums / Tanks / Structures / Misc. Demolition and Removal).

### **.32 MATERIAL HANDLING/TRANSPORTATION**

Phase 1 to 5

The definition for this element is consistent across the all phases (1 through 6). This element includes all material handling throughout the WBS with the following two exceptions:

The material transportation from groundwater and surface water sites to an on-site treatment facility is included with those elements.

The transportation to an off-site Commercial Disposal Facility is included with that element because the activities with that transportation are often covered by the contracted disposal facility.

The cost of transportation to off-site commercial disposal facilities can still be considered part of this element, but it should be noted as such. Many of the handling and transportation devices are required for the high hazardous materials such as transuranic waste.

### **.33 DISPOSAL - COMMERCIAL**

Phases 1 to 5

The definition for this element is consistent across the all phases (1 through 6). Commercial disposal provides for the final placement of HTRW at third party commercial facilities that charge a fee to accept waste depending on a variety of waste acceptance criteria. Fees are assessed based on different waste categories, methods of handling, and characterization. Disposal may be accomplished through the use of secure landfills, surface impoundments, deep well injection, or incineration.

Includes transportation to the final Destruction/Disposal/Storage facility. Excludes transportation to a facility for treatment prior to disposal.